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Docket No.: 1349.1028

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Soon-kyo HONG et al.

Serial No. 09/955,061 Group Art Unit: 3729

Confirmation No. 8477

Filed: September 19, 2001 Examiner: Kim, Paul D.

For: A DISC BALANCING DEVICE

APPEAL BRIEF UNDER 37 C.F.R §§ 41.31

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Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to the Appellant's earlier filed Notice of Appeal on February 18, 2005, Appellant hereby appeals to the Board of Patent Appeals and Interferences from the final rejection mailed October 26, 2004.

Appellant submits this Appeal Brief in response to the Notification of Non-Compliant Appeal Brief mailed June 7, 2005, as required by 37 C.F.R. §41.37. Payment of the $500.00 filing fee was made with the Appeal Brief filed on March 24, 2005.

I. REAL PARTY IN INTEREST

Pursuant to 37 C.F.R. §41.37(c)(1)(i), due to the assignment executed on September 10, 2001 by the inventors Soon-kyo HONG, Chul-woo LEE, Seung-tae JUNG and Sung-hoon CHOA, recorded in the United States Patent and Trademark Office at Reel 012179, Frame 0475, the real party in interest is as follows:

Samsung Electronics Co., Ltd.
416, Maetan-dong, Paldal-gu,
Suwon-city, Kyungki-do
Republic of Korea

II. RELATED APPEALS AND INTERFERENCES

Pursuant to 37 C.F.R. §41.37(c)(1)(ii), although the real party in interest has other appeals and interferences, none of the other pending appeals and interferences is believed to directly affect or be directly affected by, or have any bearing upon the decision of the Board of Patent Appeals and Interferences in this appeal.

III. STATUS OF CLAIMS

Pursuant to 37 C.F.R. §41.37(c)(1)(iii), claims 1 through 4 and 14-16 are pending and under consideration in this application at the filing of this Appeal Brief. Claims 15 and 16 are indicated as containing allowable subject matter, and claims 1 through 4 and 14 stand finally rejected. Non-elected claims 5-13 have been cancelled. Claims 1 and 14 are independent claims, and claims 2 through 4, and 15 through 16 are dependent claims.

Claims 1 through 16 were originally filed in the application with claims 5-13 later being withdrawn as drawn to a non-elected invention.

In the Amendment filed April 19, 2004 claims 1, 3 and 14-15 were amended. In the Response and Request for Reconsideration filed on September 15, 2004, no claims were amended.

In the Response and Request for Reconsideration filed under 37 C.F.R. §1.116 on January 21, 2005, the non-elected and withdrawn claims 5 through 13 were cancelled without prejudice or disclaimer to the subject matter recited therein.

Thus, in view of the final Office Action mailed October 26, 2004, claims 1 through 4 and 14 stand finally rejected. This Appeal Brief is an appeal of the finally rejected claims 1 through 4, and 14.

IV. STATUS OF AMENDMENTS

Pursuant to 37 C.F.R. §41.37(c)(1)(iv), all amendments filed have been entered.

The last response filed on January 21, 2005 under 37 C.F.R. §1.116 in response to the final Office Action of October 26, 2004 in which the non-elected withdrawn claims 5-13 were cancelled, was entered by Examiner Kim according to a Supplemental Advisory Action mailed on June 30, 2005. Accordingly, non-elected claims 5-13 have been cancelled and claims 1-4 and 14-16 remain pending.

Pursuant to 37 C.F.R. §41.37(c)(1)(viii), a copy of the claims involved in the appeal is

included in their present condition in Appendix A. Appendix A further contains the remaining claims for the convenience of the Board.

V. SUMMARY OF THE INVENTION

Pursuant to 37 C.F.R. §41.37(c)(1)(v), the present invention is directed to a disc balancing apparatus which balances an eccentric mass of a disc. As illustrated in FIG. 3, a disc balancing device includes a disc assembly 10, a displacement measurement unit 20 which measures vibration in the disc assembly 10 during rotation, a phase angle measurement unit 21, an operation/control unit 23, and a laser cutter 25. (See paragraph 0018, page 4).

The disc assembly 10 includes a driving source such as a spindle motor 12, and at least one disc 14 connected to a rotation unit 13 of the spindle motor 12. The rotation unit 13 incorporates a rotation shaft 12a of the spindle motor 12 and a hub connected to the rotation shaft 12a. The disc 14 may be a single layer or may be formed in a multi-layer structure. Spacers 15 are provided between the discs 14 when the multi-layer structure is used. The discs 14 are fixed to the rotation unit 13 by a clamp 16 disposed at the rotation unit 13. Accordingly, the clamp 16 is rotated with the rotation unit 13 and the discs 14. As illustrated in FIG. 4, a reference point P is marked on the clamp 16 to allow a phase angle to be determined. (See paragraphs 0020-0021, page 5).

The displacement measurement unit 20 measures vibration caused by the eccentric mass of the discs 14 biasing a portion of the discs 14 during rotation. More particularly, the displacement measurement unit 20 measures displacement of the rotated disc assembly 10. The displacement measurement unit 20 transmits the vibration information to an operation/control unit 23. (See paragraph 0020, page 5).

As shown in FIGs. 3 and 4, the phase angle measurement unit 21 simultaneously measures a phase angle of the clamp 16, from the reference point P, when the discs 14 are rotating on the production line of the disc assembly 10. As depicted in FIG. 4, the phase angle measurement unit 21 is a photo sensor measuring the phase angle by irradiating light toward the reference point P and receiving a reflected light from the clamp 16. The phase angle measurement unit 21 transmits the phase angle information to the operation/control unit 23. (See paragraphs 0019-0021, pages 4-5).

The operation/control unit 23 may be a computer which can operate data and control a mechanical device such as a robot. The operation/control unit 23 calculates the eccentric mass

and position of the disc assembly 10 by using the biased vibration information from the displacement measurement unit 20 and the phase angle information from the phase angle measurement unit 21. The eccentric mass and position information of the disc assembly 10 calculated in the operation/control unit 23 are used as reference data for controlling the laser cutter 25. (See paragraphs 0022-0023, pages 5-6).

The laser cutter 25 tracks the side portion of the disc 14 corresponding to the eccentric mass position calculated in the operation/control unit 23, and laser-cuts the side portion of the disc 14 corresponding to the calculated eccentric mass. The laser cutter 25 may be installed on the arms of an industrial robot (not shown) controlled by the operation/control unit 23. After determining the eccentric mass position, the operation/control unit 23 stops rotation of the discs 14 and then controls the laser cutter 25 to remove the eccentric mass. (See paragraphs 0023-0026, pages 6-7).

A dust inhaler 27, illustrated in FIG. 3, is provided to remove dust generated when the side rim portion of the discs 14 is laser-cut. Similarly to the laser cutter 25, the dust inhaler 27 may be installed using a robot arm that is controlled by the operation/control unit 23. Accordingly, the dust inhaler 27 tracks the eccentric position calculated in the operation/control unit 23, namely the cutting position, and inhales dust created during the cutting process. As with the other measurement units 20 and 21, the laser cutter 25 and the dust inhaler 27 are disposed at the production line of the disc assembly 10. Therefore, the eccentric mass of the disc assembly 10 can be balanced to reduce vibration before finishing production of a disc drive using the disc assembly 10, which results in high quality products. (See paragraph 0024, page 6).

VI. ISSUES

1. Whether claim 14 is unpatentable under 35 U.S.C. §102(b) over Duston et al. (U.S, Patent No. 3,538,298).

2. Whether claims 1-4 are unpatentable under 35 U.S.C. §103(a) over Duston et al. (U.S, Patent No. 3,538,298) in view of Scuricini (U.S. Patent No. 4,096,988).

VII. GROUPING OF CLAIMS

Pursuant to 37 C.F.R. §41.37(c)(1)(vii), the claims are grouped as follows and ordered to match the order in the Final Office Action mailed October 26, 2004 for ease of reference:

1. Independent claim 14 stands or falls alone on the issue of anticipation.

2. Independent claim 1 and dependent claims 2-4 are argued together and stand or fall together on the issue of obviousness.

VIII. ARGUMENT

1. Claim 14 is patentably distinguishable over Duston et al. (U.S, Patent No. 3,538,298).

Claim 14 recites, inter alia, "at least one disc rotatably disposed at the driving source; a measurement unit measuring an eccentric portion of the at least one disc; and a laser cutter moving to cut a portion of the disc corresponding to the measured eccentric portion, while the disc is not rotating."

In order to reject a claim under 35 U.S.C. §102, a reference must be provided which discloses each element of the claim in the manner recited in the claim. In interpreting the reference, the Examiner is to broadly interpret the claim, but must do so within the bounds of reason. In re Morris, USPQ2d 1023, 1027-28 (Fed. Cir. 1997), MPEP 2131 and 2111. Thus, claim limitations are to be interpreted in light of its broadest reasonable interpretation. In re Prater, 162 USPQ 541, 550-51 (CCPA 1969), cited with approval, In re Morris, 44 USPQ2d 1023, 1028 (Fed. Cir. 1997). Further, the claims should be interpreted in light of their plain meaning as understood by one of ordinary skill in the art. In re Zletz, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989),citing, In re Prater. However, the broadest reasonable interpretation must also conform to the broadest reasonable interpretation afforded by one of ordinary skill in the art *when read in light of the specification*. In re Prater, 162 USPQ 541, 550-51, In re Morris, 44 USPQ2d at 1027, MPEP 2111.01 (7th Ed., rev. 1) (Feb. 2000). Thus, while the Examiner is to avoid reading limitations from the specification into the claims, the Examiner should not interpret claim limitations so broadly as to contradict or otherwise render a limitation meaningless as

would be understood by those of ordinary skill in the art. See, In re Cortright, 49 USPQ2d 1464, 1467 (Fed. Cir. 1999), In re Zletz, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989), MPEP 2111.01.

Duston et al. does not disclose a disc assembly, a disc or a laser cutter cutting the disc while the disc is not moving.

A "disc" is defined as "a thin circular object" or "a round flat plate coated with a magnetic substance on which data for a computer is stored." (Merriam-Webster OnLine Dictionary February 24, 2005). This plain meaning definition is also the definition supported in the originally filed specification and drawings of the present invention. Specifically, that a disc stores data and is part of a disc drive such as a hard disc drive. (See paragraphs 0001 and 0002, page 1 of the originally filed specification).

Duston et al. does not disclose a disc, rather it discloses a cylindrical object 4. As described by Duston et al. the rotating unit has two ends. (col. 4, lines 3-12). Further, the balancer disclosed in Duston et al. focuses the laser on the rotating object between a pair of annular grooves 6 and 17. Again, this clearly points out that the rotating unit of Duston et al. is not a flat disc, but rather a large cylindrical body. A cylinder is not a disc. Because no disc is disclosed there can be no disclosure of a disc assembly.

Duston et al. discloses a method of balancing rotating objects. The discussed improvement of Duston et al. is that a laser may be used rather than the time consuming and expensive mechanical techniques. (Col. 1, lines 24-29 and 63-65). An important distinction in Duston et al. is that the previous *mechanical techniques* involved stopping the rotary motion of the object and using drills to remove material from the heavy side (i.e., "a region running longitudinally along the surface of the rotating unit") and then rotating the object again to check the effectiveness of the material removal. (Col. 1 line 30- col. 1 line 65).

In contrast, every disclosure in Duston et al. of a laser removal technique involves a rotating object. (Col. 1, lines 69-72, col. 3. lines 1-4). Indeed, the laser removal technique of Duston et al. requires that the object be rotating in order for the removal process to work correctly. (See col. 3, lines 5-44). As clearly stated "FIG. 2 illustrates an apparatus arrangement which may be used to remove material from a **rotating** object." (Col. 3, lines 55-56) (Emphasis added). Combining selected inapposite portions of the disclosed mechanical drilling technique in Duston et al. and the laser cutting technique (i.e., the invention of Duston et al. teaching away from the mechanical technique) is not appropriate. These are separate devices and there is absolutely no teaching to make such a combination of disparate elements. Indeed, because the

laser cutting invention of Duston et al. is described as overcoming problems with the mechanical technique, the reference teaches away from any such combination. There is absolutely no support or teaching for the combination of the background of Duston et al. and the invention of Duston et al. that the Examiner is making.

Duston et al. also fails to disclose the claimed laser cutter moving to cut a portion of a disk corresponding to the measured eccentric portion. The cutting of an eccentric portion of a disk is different from cutting an eccentric portion of a cylinder. The invention of Duston et al. is primarily drawn to adding an additional groove in a cylinder such that any laser etching of the cylinder will only etch a plateau portion circumferentially arranged around the cylinder and any overflow of etching material will fall off because of the etching area being a plateau. Regardless, the etching is performed in particular heavy areas around the cylinder according to the detected cylinder's eccentricity. Thus, any laser melting in Duston et al. is for compensating for cylindrical eccentricity, which is not the same as eccentricity of a disc as recited in the claims of the present invention and described in the originally filed specification.

The Examiner is mischaracterizing the invention of Duston et al. as disclosing a disc when this is clearly not the case. Further, the Examiner mischaracterizes the disclosure of Duston et al. in alleging that a laser cutter while the disc is not rotating is disclosed at col. 1 lines 49-62. (Office Action mailed October 26, 2004, page 2). As discussed above, the removal of material at the location specified by the Examiner refers to a mechanical technique involving drills and not the laser removal process described as the invention of Duston et al. A drill removal technique does not teach a laser removal process.

Thus, it is respectfully submitted that Duston et al. does not disclose "at least one disc rotatably disposed at the driving source; a measurement unit measuring an eccentric portion of the at least one disc; and a laser cutter moving to cut a portion of the disc corresponding to the measured eccentric portion, while the disc is not rotating" as recited in independent claim 14.

2. Claims 1-4 are patentably distinguishable over Duston et al. (U.S, Patent No. 3,538,298) in view of Scuricini (U.S. Patent No. 4,096,988).

Claim 1 recites, inter alia, "a displacement measurement unit measuring vibration in the rotation of the disc assembly; a phase angle measurement unit measuring a phase angle from a reference point of the disc assembly in the rotation of the disc assembly; an operation/control unit calculating an eccentric mass and an eccentric position of the disc assembly, by using the

biased vibration measured in the displacement measurement unit and the phase angle measured in the phase angle measurement unit; and a laser cutter moving to track and to laser-cut a side portion of the disc corresponding to the eccentric position, while the disc is not rotating, according to the eccentric mass information from the operation/control unit, wherein the eccentric mass of the disc assembly is balanced to reduce vibration in the rotation thereof."

In general, in order to reject a claim under 35 U.S.C. §103, a reference must be provided which discloses each element of the claim in the manner recited in the claim. In interpreting the reference, the Examiner is to broadly interpret the claim, but must do so within the bounds of reason. In re Morris, USPQ2d 1023, 1027-28 (Fed. Cir. 1997), MPEP 2131 and 2111. Thus, while the Examiner is to avoid reading limitations from the specification into the claims, the Examiner should not interpret claim limitations so broadly as to contradict or otherwise render a limitation meaningless as would be understood by those of ordinary skill in the art. See, In re Cortright, 49 USPQ2d 1464, 1467 (Fed. Cir. 1999), In re Zletz, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989), MPEP 2111.01.

For reasons similar to those mentioned above in the arguments in support of patentability of claim 14, Duston et al., either alone or in combination with Scuricini, does not disclose all the limitations of independent claim 1. Duston et al. does not disclose a disc, does not disclose cutting a disc while the disc is not moving and does not disclose a disc assembly. Further, as admitted in the Office Action mailed October 26, 2004, Duston et al. does not disclose an operation/control unit as recited in claim 1.

Scuricini does not cure the defects of Duston et al. Scuricini discloses an apparatus for balancing a cylindrical rotor with an attached annular belt for a centrifuge. (Col. 1, lines 6-15, FIG. 2). Similarly to Duston et al., there is no way to characterize the rotor 1 and belt 14 of Scuricini as disclosing a disc as recited in the claims without rendering the limitation meaningless. In Scuricini, the belt 14 is fixed to the cylindrical body 1. (Col. 5, lines 30-36). Scuricini discloses that a laser 12 is used to melt or sublimate material from the belt 14 **during rotation** of the belt and cylindrical rotor 1. (Col. 5, lines 39-54) (Emphasis added). Scuricini further discloses that the balancing of the rotor 1 in the case of the centrifuge requires that the center of gravity must coincide with the geometrical center as much as possible. Scuricini discloses that "the most rapid and exact way and **without having to stop the rotor**" to remove mass eccentricity and dynamically balance the cylindrical rotor 1 of the centrifuge is according to the apparatus disclosed. (Col. 6, lines 36-40) (Emphasis added). However, the belt 14 and rotor 1 of Scuricini does not disclose a disc assembly as recited in claim 1. Claims should not be

interpreted so broadly as to render a limitation meaningless. The scope of the references is not analogous art because the subject matter disclosed is not of the same character. Balancing a thin disc and balancing a cylinder have different issues one of which is the size and precision necessary to balance a disc.

Combining Duston et al. and Scuricini discloses an apparatus for balancing cylindrical rotating bodies while the rotating body is moving. The combination does not disclose a disc, a disc assembly or cutting a side portion of the disc as recited in claim 1.

Claims 2-4 are deemed patentable due at least to their dependence from claim 1.

Thus, it is respectfully submitted that Duston et al. in view of Scuricini does not disclose "a displacement measurement unit measuring vibration in the rotation of the disc assembly; a phase angle measurement unit measuring a phase angle from a reference point of the disc assembly in the rotation of the disc assembly; an operation/control unit calculating an eccentric mass and an eccentric position of the disc assembly, by using the biased vibration measured in the displacement measurement unit and the phase angle measured in the phase angle measurement unit; and a laser cutter moving to track and to laser-cut a side portion of the disc corresponding to the eccentric position, while the disc is not rotating, according to the eccentric mass information from the operation/control unit, wherein the eccentric mass of the disc assembly is balanced to reduce vibration in the rotation thereof," as recited in independent claim 1.

IX. CONCLUSION

In view of the law and facts, the Appellants respectfully submit that the Examiner has failed to cite references that support an anticipation rejection and an obviousness rejection of the claims and has failed to rebut the arguments in the response filed on January 21, 2005.

The Appellants respectfully submit that, even given the broadest reasonable interpretation, the cylindrical balancer of Duston et al., either alone or in any proper combination with Scuricini, does not disclose the invention as recited in claims 1, 2-4 and 14.

Thus, Appellants respectfully submit that the Examiner's findings of unpatentability with respect to claims 1, 2-4 and 14 should be reversed.

The Commissioner is hereby authorized to charge any additional fees required in connection with the filing of the Appeal Brief to our Deposit Account No. 503333.

Respectfully submitted,

Stein, McEwen & Bui, LLP

Date: July 6 2005

By: _____
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APPENDIX A:

1. (PREVIOUSLY PRESENTED) A disc balancing device which balances a disc comprising:

a disc assembly having a driving source, wherein the disc is rotatably disposed at the driving source;

a displacement measurement unit measuring vibration in the rotation of the disc assembly;

a phase angle measurement unit measuring a phase angle from a reference point of the disc assembly in the rotation of the disc assembly;

an operation/control unit calculating an eccentric mass and an eccentric position of the disc assembly, by using the biased vibration measured in the displacement measurement unit and the phase angle measured in the phase angle measurement unit; and

a laser cutter moving to track and to laser-cut a side portion of the disc corresponding to the eccentric position, while the disc is not rotating, according to the eccentric mass information from the operation/control unit, wherein the eccentric mass of the disc assembly is balanced to reduce vibration in the rotation thereof.

2. (ORIGINAL) The device according to claim 1, further comprising a dust inhaler inhaling dust generated when the side portion of the disc is cut by the laser cutter.

3. (PREVIOUSLY PRESENTED) The device according to claim 2, further comprising a robot unit, wherein the dust inhaler and the laser cutter are moved by the robot unit controlled by the operation/control unit, to track the eccentric position.

4. (ORIGINAL) The device according to claim 1, wherein the phase angle measurement unit is a photo sensor measuring the phase angle by irradiating light to the reference point and receiving a reflection light from the disc assembly.

5-13 (CANCELLED)

14. (PREVIOUSLY PRESENTED) A disc balancing device comprising:

a disc assembly having a driving source and at least one disc rotatably disposed at the driving source;

a measurement unit measuring an eccentric portion of the at least one disc; and

a laser cutter moving to cut a portion of the disc corresponding to the measured eccentric portion, while the disc is not rotating.

15. (PREVIOUSLY PRESENTED) The device according to claim 14, wherein:

a plurality of discs is rotatably disposed at the driving source;

the measurement unit measures an eccentric portion of the discs; and

the laser cutter moves to cut a portion of the discs corresponding to the measured eccentric portion, while the discs are not rotating.

16. (ORIGINAL) The device according to claim 1, wherein the device balances a plurality of discs, wherein:

the discs are rotatably disposed at the driving source; and

the laser cutter tracks and laser-cuts side portions of the discs corresponding to the eccentric position according to the eccentric mass information from the operation/control unit, wherein the eccentric mass of the disc assembly is balanced to reduce vibration in the rotation.